

**RESPONSE UNDER 37 C.F.R. 1.116  
EXPEDITED PROCEDURE  
EXAMINING GROUP 2169**

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	KYLE G. PELTONEN ET AL.	Examiner:	HUNG Q. PHAM
Application No.:	10/775,749	Group Art Unit:	2169
Filed:	FEBRUARY 10, 2004	Docket No.:	14917.1191US01
Title:	SYSTEM AND METHOD FOR FACILITATING FULL TEXT SEARCHING UTILIZING INVERTED KEYWORD INDICES		

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**AMENDMENT UNDER 37 C.F.R. § 1.116**

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Dear Examiner:

In response to the Office Action of September 15, 2008, please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 7 of this paper.

**Amendments to the Claims:**

1. (Previously presented) A method for facilitating full text searching of a set of data, the method comprising:

obtaining keyword data corresponding to a set of data;

generating an inverted keyword index and a separate inverted keyword attribute index corresponding to the keyword data, the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information;

storing the inverted keyword index and the inverted keyword attribute index in a shared process memory;

obtaining a keyword query from a first process; and

processing the keyword query using the inverted keyword index and the inverted keyword attribute index stored in the shared process memory.

2. (Original) The method as recited in Claim 1, wherein the set of data corresponds to a set of documents.

3. (Original) The method as recited in Claim 1, wherein the set of data corresponds to a set of rows in a database.

4. (Canceled)

5. (Previously presented) The method as recited in Claim 1, wherein the inverted keyword attribute index corresponds to keyword occurrence information in the set of data.

6. (Canceled)

7. (Previously presented) The method as recited in Claim 1, wherein the inverted keyword index and the inverted keyword attribute index correspond to red and black index trees.

8. (Original) The method as recited in Claim 1, wherein storing the inverted keyword index includes dynamically adjusting memory pointers corresponding to the inverted keyword index.

9. (Original) A computer-readable medium having computer-executable instructions for performing the method recited in Claim 1.

10. (Original) A computer system including a processor, a memory, and an operating environment, the computer system operable to perform the method recited in Claim 1.

11. (Currently amended) A method for facilitating full text searching of a set of data, the method comprising:

obtaining keyword data corresponding to a set of data;

generating an inverted keyword index and a separate inverted keyword attribute index corresponding to the keyword data, wherein the inverted keyword index is a inverted keyword red and black tree index, wherein the separate inverted keyword attribute index is an inverted keyword attribute red and black tree index, wherein generating the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index includes:

(a) obtaining a first keyword from the set of data,

(b) inserting the keyword into the red and black index of the inverted keyword red and black tree index,

(c) inserting keyword attribute data corresponding to the keyword into a temporary keyword attribute index,

(d) repeating (a)-(c) for all keyword data in the set of data, and

(e) converting the temporary keyword attribute index into the inverted keyword attribute red and black tree index in the shared process memory buffer;  
~~the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information; and~~  
storing the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index ~~inverted keyword index and the inverted keyword attribute index~~ in a shared process memory buffer.

12. (Original) The method as recited in Claim 11, wherein the set of data corresponds to a set of documents.

13. (Original) The method as recited in Claim 11, wherein the set of data corresponds to a set of rows in a database.

14. (Currently amended) The method as recited in Claim 11, wherein the inverted keyword attribute red and black tree index ~~inverted keyword attribute index~~ corresponds to keyword occurrence information.

15.-17. (Canceled)

18. (Currently amended) The method as recited in Claim 11 further comprising:  
obtaining a keyword query from a process; and  
processing the keyword query from the inverted keyword red and black tree index ~~inverted keyword index~~ in the shared memory buffer.

19. (Currently amended) The method as recited in Claim 18 further comprising:  
obtaining a second keyword query from a second process; and

processing the keyword query using the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index ~~inverted keyword index and the inverted keyword attribute index~~ stored in the shared process memory buffer.

20. (Currently amended) The method as recited in Claim 11, wherein storing the inverted keyword red and black tree index ~~inverted keyword index~~ includes dynamically adjusting memory pointers corresponding to the inverted keyword red and black tree index ~~inverted keyword index~~.

21. (Original) A computer-readable medium having computer-executable instructions for performing the method recited in Claim 11.

22. (Canceled)

23. (Previously presented) A system for facilitating full text searching, the system comprising:

- one or more processes for issuing keyword queries;
- an index generation component for obtaining a set of data and generating an inverted keyword index and a separate inverted keyword attribute index, the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information;
- a shared memory buffer for storing the inverted keyword index and the inverted keyword attribute index of a set of data; and
- a query processing component for processing keyword queries issued by the one or more processes using the inverted keyword index and the inverted keyword attribute index stored in the shared memory buffer.

24. (Original) The system as recited in Claim 23, wherein the inverted keyword index corresponds to a set of documents.

25. (Original) The method as recited in Claim 23, wherein the set of data corresponds to a set of rows in a database.

26. (Previously presented) The system as recited in Claim 23, wherein the shared memory buffer includes the inverted keyword attribute index corresponding to each node in the inverted keyword index.

27. (Original) The system as recited in Claim 26, wherein the inverted keyword attribute index corresponds to keyword occurrence information in the set of data.

28. (Canceled)

29. (Original) The system as recited in Claim 26, wherein the inverted keyword index and the inverted keyword attribute index are red and black index trees.

30. (Original) The system as recited in Claim 24, wherein the inverted keyword index includes a set of pointers dynamically adjusted according to the one or more processes accessing the inverted keyword index.

31. (Original) The system as recited in Claim 23 further comprising:  
a disk subsystem for storing at least a portion of the inverted keyword index of a set of data; and  
a merge process for merging the inverted keyword index in the shared memory with the portion of the inverted keyword index in the disk subsystem

## **REMARKS/ARGUMENTS**

The claims have been amended as set forth above. Independent claim 11 has been amended for clarity reasons. The other independent claims have not been amended in that applicants respectfully disagree with the rejections set forth in the Office Action. Reconsideration and removal of the finality of this matter is respectfully solicited.

### **I. Rejection of the Claims**

Claims 1-3, 5, 8-14, 18-21, 23-27 and 30 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 7,249,748 issued to Stephan (hereinafter "Stephan"). Claims 7, 16, 17 and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Stephan in view of U.S. Patent No. 7,069,272 issued to Snyder (hereinafter "Snyder"). Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Stephan in view of U.S. Patent No. 7,043,472 issued to Aridor et al. (hereinafter "Aridor"). Applicants respectfully disagree with the rejections.

Independent claim 1 includes the following combination of features that is not taught or otherwise suggested by the cited references:

obtaining keyword data corresponding to a set of data;

generating **an inverted keyword index** and **a separate inverted keyword attribute index** corresponding to the keyword data, the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information;

**storing the inverted keyword index and the inverted keyword attribute index in a shared process memory;**

obtaining a keyword query from a first process; and

processing the keyword query **using the inverted keyword index and the inverted keyword attribute index stored in the shared process memory.**

The cited references teach directly away from the above combination of features. As indicated in claim 1, claim 1 recites an inverted keyword index **and a separate inverted keyword attribute index**. It is clear that claim 1 is reciting two separate indexes. Each index includes separate information to cause different functionality. They are separately stored in the shared process memory and each is used to process the keyword query. With regard to Stephan, Stephan is teaching a single expanded inverted index. The inverted index itself is expanded to include further information. Stephan is not teaching the two separate indexes as indicated in independent claim 1. Stephan actually teaches directly away from two separate indexes as indicated. Stephan teaches that “[a]n expanded inverted list for an index term can be structured to improve phrase query searching **without using an auxiliary index**.” (Stephan, col. 4, lines 21-23). Throughout Stephan, Stephan is teaching a single index. Accordingly, applicants respectfully request reconsideration and allowance of independent claim 1.

Independent claim 23 includes the following combination of features that is not taught or otherwise suggested by the cited references:

one or more processes for issuing keyword queries;

an index generation component for obtaining a set of data and generating an **inverted keyword index and a separate inverted keyword attribute index**, the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information;

a shared memory buffer for storing **the inverted keyword index and the inverted keyword attribute index of a set of data**; and

a query processing component for processing keyword queries issued by the one or more processes **using the inverted keyword index and the inverted keyword attribute index stored in the shared memory buffer**.

The cited references teach directly away from the above combination of features. As indicated in claim 23, claim 23 recites an inverted keyword index **and a separate inverted keyword attribute index**. It is clear that claim 23 is reciting two separate indexes. Each index



includes separate information to cause different functionality. They are separately stored in the shared process memory and each is used to process the keyword query. With regard to Stephan, Stephan is teaching a single expanded inverted index. The inverted index itself is expanded to include further information. Stephan is not teaching the two separate indexes as indicated in independent claim 23. Stephan actually teaches directly away from two separate indexes as indicated. Stephan teaches that “[a]n expanded inverted list for an index term can be structured to improve phrase query searching without using an auxiliary index.” (Stephan, col. 4, lines 21-23). Throughout Stephan, Stephan is teaching a single index. Accordingly, applicants respectfully request reconsideration and allowance of independent claim 23.

Independent claim 11 has been amended to include the following combination of features that is not taught or otherwise suggested by the cited references:

obtaining keyword data corresponding to a set of data;

generating an inverted keyword index and a separate inverted keyword attribute index corresponding to the keyword data, wherein the inverted keyword index is a inverted keyword red and black tree index, wherein the separate inverted keyword attribute index is an inverted keyword attribute red and black tree index, wherein generating the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index includes:

(a) obtaining a first keyword from the set of data,

(b) inserting the keyword into the red and black index of the inverted keyword red and black tree index,

(c) inserting keyword attribute data corresponding to the keyword into a temporary keyword attribute index,

(d) repeating (a)-(c) for all keyword data in the set of data, and

(e) converting the temporary keyword attribute index into the inverted keyword attribute red and black tree index in the shared process memory buffer;  
and

storing the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index in a shared process memory buffer.

The cited references teach directly away from the above combination of features. As indicated in claim 11, claim 11 recites an inverted keyword index **and a separate inverted keyword attribute index**. It is clear that claim 11 is reciting two separate indexes. Each index includes separate information to cause different functionality. They are separately stored in the shared process memory and each is used to process the keyword query. With regard to Stephan, Stephan is teaching a single expanded inverted index. The inverted index itself is expanded to include further information. Stephan is not teaching the two separate indexes as indicated in independent claim 11. Stephan actually teaches directly away from two separate indexes as indicated. Stephan teaches that “[a]n expanded inverted list for an index term can be structured to improve phrase query searching **without using an auxiliary index**.” (Stephan, col. 4, lines 21-23). Throughout Stephan, Stephan is teaching a single index.

Moreover, independent claim 11 has been further amended as set forth above. Independent claim 11 recites that generating the inverted keyword red and black tree index and the inverted keyword attribute red and black tree index includes the combination of: (a) obtaining a first keyword from the set of data; (b) inserting the keyword into the red and black index of the inverted keyword red and black tree index; (c) inserting keyword attribute data corresponding to the keyword into a temporary keyword attribute index; (d) repeating (a)-(c) for all keyword data in the set of data; and (e) converting the temporary keyword attribute index into the inverted keyword attribute red and black tree index in the shared process memory buffer. This combination of features is not taught or otherwise suggested by any of the cited references. Accordingly, applicants assert that independent claim 11 is allowable over the cited references.

With regard to the dependent claims, the dependent claims include features that are not taught or suggested by the cited references. Moreover, those claims ultimately depend from the independent claims set forth above. As such, they should be found allowable for at least those same reasons.

**II. Request for Reconsideration**

In view of the foregoing amendments and remarks, all pending claims are believed to be allowable and the application is in condition for allowance. Therefore, a Notice of Allowance is respectfully requested. Should the Examiner have any further issues regarding this application, the Examiner is requested to contact the undersigned attorney for the applicants at the telephone number provided below.

Respectfully submitted,

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